

LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory, May 10-17, 2010

Finding the bug in minutes



The one-inch wide by three-inch long Lawrence Livermore Microbial Detection Array.

New technology, developed by Lab scientists can help detect all the bacteria and viral sequences known to man in a relatively short amount of time.

The breakthrough already is assisting those charged with homeland security. Back in 2002, the Lab's Tom Slezak and his team were asked to build a system that could detect certain viruses and bacteria agents to protect fans attending the winter Olympics in Salt Lake City.

What they came up with is the Lawrence Livermore Microbial Detection Array of the LLMDA.

With a simple blood sample, and 24 hours time, they can identify any virus or bacteria that has been sequenced, more than 2,000 viruses, and 900 bacteria.

To read more, go to <http://www.kcbs.com/bayareanews/Breakthrough-at-Livermore-Labs/7004433>.

To listen, go to
http://www.kcbs.com/topic/play_window.php?audioType=Episode&audioid=4639438

VERI-fying what's in cargo containers



A VeriTainer Corp. employee is shown at a port where the crane is in operation.

The Lab has signed an agreement with VeriTainer Corporation to refine and enhance the company's crane mounted scanning technology.

The agreement will be in place for three-and-a-half years and require approximately \$4 million in funding. LLNL will work in cooperation with VeriTainer's scientists and engineers to enhance both gamma and neutron detection sensitivity, while maintaining the capabilities of VeriTainer's CMS. The system has been operated for the past four years in field tests run at three ports and in five different terminals.

The Laboratory will use its expertise not only to optimize the sensitivity of the system, but also to leverage the platform to deliver an effective counterterrorism system.

To read more, go to

<http://sanfrancisco.bizjournals.com/sanfrancisco/stories/2010/05/10/daily37.html>

Fusion ready to ignite



The tiny device at the end of NIF's target arm is where the laser's 192 beams.

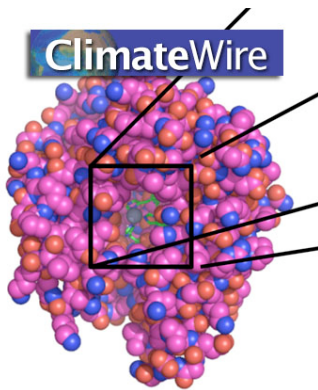
Every 20 years, scientists claim they will achieve fusion. And when that another 20 years is up, they say it will be 20 years before they achieve fusion.

But scientists at Lawrence Livermore aren't claiming it will be 20 years before they achieve fusion. In fact, it will be sometime in the next year. Experiments at the National Ignition Facility to create the same energy that fuels the sun will begin later this year.

Researchers around the world are waiting anxiously to see if NIF's laser, which produces the world's highest energy pulses and is the largest of its kind, really can ignite a tiny version of the sun.

To read more, go to <http://www.sciencemag.org/cgi/content/full/328/5980/808>

Recovery act dollars capture carbon



Carbonic anhydrase

The Laboratory has received \$3.6 million in American Recovery Act funding to find a cheaper, more effective way to capture and store carbon dioxide from power plants, through a process that replicates what happens with human breathing.

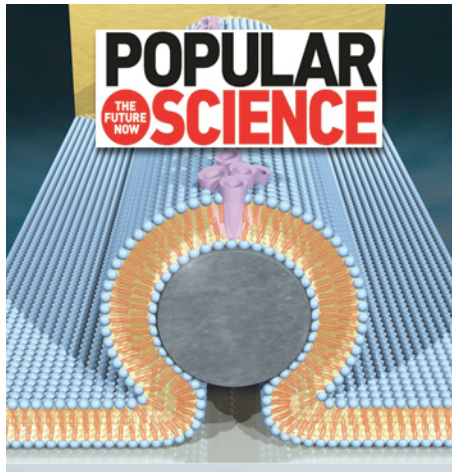
Lab researchers will work with a synthetic version of an enzyme -- carbonic anhydrase -- that the human body uses to bind CO₂ quickly to blood and then expel it from the human body. Scientists are hoping that if they mimic the natural process in a lab, they can speed up the mechanism by which carbon dioxide attaches to a liquid solvent after being emitted with other gases from a power plant.

In theory, the solvent, which could include various chemical mixes, then would be heated so the CO₂ is removed for later permanent storage underneath the earth.

This will open up a new range of process conditions and methods for industrial CO₂ capture, ranging from near-term improvement of existing processes to new capture technologies in the longer term.

To read more, go to <http://www.eenews.net/climatewire/2010/05/10/5/> or see the pdf at https://publicaffairs.llnl.gov/news/lab_report/2010/enzyme.www.eenews.net.pdf

Bonding with machines



Can an artist's representation of a bioanoelectronic device incorporating a biological pore.

Laboratory scientists have taken a big step toward bridging the gap between mind and machine. Using ATP – adenosine triphosphate, the molecular medium of energy exchange present in nearly all living cells – the team has created a novel transistor that could allow electronic devices that can be hooked directly into the nervous system.

The transistor, which creator Aleksandr Noy calls the first integrated bioelectronic system, consists of a carbon nanotube stretched between two electrodes that is wrapped in an insulator at both ends but exposed in the middle. The transistor is then wrapped in a lipid bi-layer akin to those that surround the cells that make up our bodies.

When the team applied voltage to the electrodes and poured a solution full of ATP and potassium and sodium ions over the transistor, current flowed from electrode to electrode.

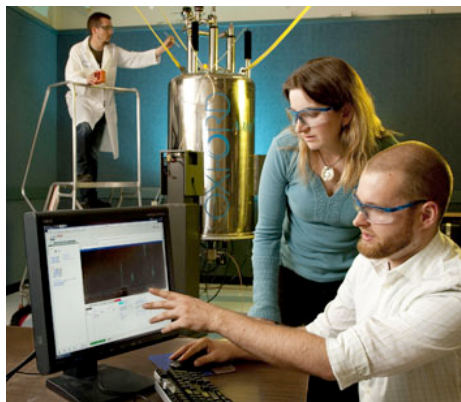
To read more, go to <http://www.popsci.com/technology/article/2010-05/bioelectric-nanotube-transistor-could-bring-biology-and-machines-closer-together>

Latest *Newsline* available



Newsline provides the latest Lab research and operations news. See the most recent issue at <https://newsline.llnl.gov>

Photo of the week



Check it out: Researchers Bryan Mayer and Sarah Chinn study the nuclear magnetic resonance (NMR) data. James Lewicki loads a sample into the NMR.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail <mailto:labreport@llnl.gov>.

The *Livermore Lab Report* archive is available at:
https://publicaffairs.llnl.gov/news/lab_report/2010index.html